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TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	09/776,036
Filing Date	02/02/2001
First Named Inventor	D. Malfer et al.
Group Art Unit	1714; Conf. No.: 8721
Examiner Name	C. Toomer
Total Number of Pages in This Submission: 22	Attorney Docket Number: EP-7503

ENCLOSURES *(check all that apply)*

- [ ] Fee Transmittal Form
  - [ ] Fee Attached
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  - [+] After Final
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- [ ] Extension of Time Request
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- [ ] Information Disclosure Statement
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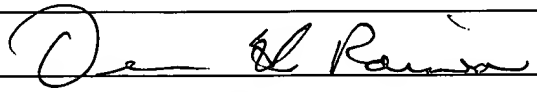
Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm *or* Individual name	Dennis H. Rainear, Reg. No. 32,486
Signature	
Date	March 17, 2003

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s):	Malfer et al.	**Examiner:**	Toomer, Cephia D.
Date Filed:	02/02/2001	**Art Unit:**	1714
Application No.:	09/776,036	**Confirmation No.:**	8721
Title:	Secondary Amine Mannich Detergents		

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RESPONSE AFTER FINAL ACTION

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Commissioner of Patents
Washington, DC 20231

Dear Sir:

Applicants respectfully request reconsideration of the Examiner's Final Office Action dated January 15, 2003. The amendments presented herein overcome the Examiner's rejections under 35 USC § 102(b) and 35 USC §103(a), placing the present application condition for allowance. Applicants have elected to pursue only proposed claims directed toward one focus of the invention, namely, specifying dibutylamine as the amine constituent in the Mannich reaction, which yields compositions and methods having surprising and superior effectiveness in reducing intake valve deposits and minimizing valve sticking. This preferential selection of dibutylamine as the amine constituent is fully supported by the disclosure of the present application.

IN THE CLAIMS

Please delete claims 10-12, 32-34, 54-56, and 60-62.

Replace the indicate claims with:

1. (Amended) A Mannich reaction product obtained by reacting (i) at least one di-substituted hydroxyaromatic compound having on the ring both (a) an aliphatic hydrocarbyl substituent

derived from a polyolefin having a number average molecular weight in the range of about 500 to about 3000, and (b) a C_{1-4} alkyl; (ii) dibutylamine; and (iii) at least one aldehyde.

17. (Amended) A fuel additive composition comprising:

a) a fuel soluble Mannich detergent/dispersant obtained by reacting (i) at least one di-substituted hydroxyaromatic compound having on the ring both (a) an aliphatic hydrocarbyl substituent derived from a polyolefin having a number average molecular weight in the range of about 500 to about 3000, and (b) a C_{1-4} alkyl; (ii) dibutylamine; and (iii) at least one aldehyde; and

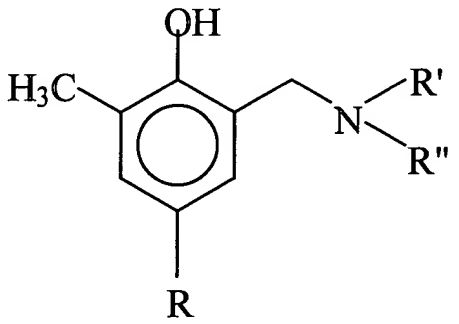
b) at least one liquid carrier for said Mannich detergent/dispersant in proportions such that for each part by weight of Mannich detergent/dispersant on an active ingredient basis there is in the range of about 0.3 to about 2.0 parts by weight of liquid carrier therefor.

40. (Amended) A fuel composition for use in a spark-ignition internal combustion engine comprising a spark-ignition fuel into which has been blended:

a) a fuel soluble Mannich detergent/dispersant obtained by reacting (i) at least one di-substituted hydroxyaromatic compound having on the ring both (a) an aliphatic hydrocarbyl substituent derived from a polyolefin having a number average molecular weight in the range of about 500 to about 3000, and (b) a C_{1-4} alkyl; (ii) dibutylamine; and (iii) at least one aldehyde; and

b) at least one liquid carrier for said Mannich detergent/dispersant in proportions such that for each part by weight of Mannich detergent/dispersant on an active ingredient basis there is in the range of about 0.3 to about 2.0 parts by weight of liquid carrier therefor; wherein a) and b) are present in an amount at least sufficient to reduce or minimize the weight of intake valve deposits in a spark-ignition internal combustion engine operated on said fuel composition.

59. (Amended) A composition of matter of the formula:



wherein R comprises a hydrocarbyl substituent having a number average molecular weight in the range of about 500 to about 3000; and R' and R" are each a butyl group.

REMARKS:

As a convenience for the Examiner, a complete set of the pending claims is attached to this response.

Rejections under 35 USC § 102(b)

The Examiner rejected claims 1-11, 13, 17-33, 35, 39-55, 57-61 and 63-64 under 35 USC § 102(b) in view of Malfer (US 5,697,988), hereinafter Malfer '988. These rejections are presently overcome by the amended claims' selection of dibutylamine as the amine constituent in the Mannich reaction, as this particular constituent is neither disclosed nor suggested in the reference, and leads to the surprising success of the present invention. Additionally, the present application's specificity in the configuration of the hydroxyaromatic constituent, a feature not disclosed in Malfer '988, leads to further refinement of the ultimate products and processes of the present invention.

Malfer '988 discloses a Mannich reaction product obtained using "an amine containing at least one >NH group" (column 2, line 49), which broadly encompasses most amines that would be functional in a reaction. The '988 specification also discloses alkane monoamines, and specifies dimethylamine (column 4, lines 9-11), but provides a preference for alkylene polyamines (column 4, line 21). It cannot be inferred from the '988 disclosure that alkane monoamines were superior to the preferred embodiments, or that a particular alkane monoamine may be more effective any other amine.

It is well-known that amines are constituents in a Mannich reaction. Specifying a *particular* amine constituent, dibutylamine, distinguishes the '988 patent from the present application's selection of one element from this broad class. An individual skilled in the art could not have contemplated the present invention's success, achieved by the strategic selection of dibutylamine. Malfer '988 teaches a class of amines distinguishable in structure and performance from the embodiments of the present invention. The amine constituent disclosed in Malfer '988 includes all amines: monoamines, polyamines, primary amines, and secondary amines, each having any conceivable constituent(s) bound to the nitrogen molecule. Merely disclosing an amine component in a reaction does not convey the compositions and methods of the present invention.

The selection of optimal components for the Mannich reaction remains an area of active investigation. On page 2, lines 3-5 of the present application, it is noted that the "selection of certain amines and hydroxyaromatic compounds" in specific proportions offers improved performance characteristics and physical properties. However, one skilled in the art could not have predicted that a dibutylamine-derived Mannich formulation would reduce intake valve deposits more effectively than those Mannich compounds prepared from an array of amines of similar structure and molecular weight. Furthermore, the novel compositions and methods achieved using dibutylamine in the Mannich reaction are further differentiated from those of the '988 patent through the present invention's limitations in the configuration of the hydroxyaromatic compound. Specifically, the present invention requires steric blocking of two positions on the hydroxyaromatic compound entering into the Mannich reaction, providing a highly specific and novel compound not disclosed in the '988 patent.

As may be seen in the following tables (Tests 1-4, below), there is no prediction of success for a particular compound based upon the success or failure of a homologous composition. Compounds of similar molecular weight and structure were used in the Mannich reaction to form compositions and methods for reducing intake valve deposits. A standard intake valve deposit test (ASTM Test No. D6201, "Standardized Test Method for Dynamometer Evaluation of Unleaded Spark-Ignition Engine Fuel for Intake Valve Deposit Formation") was performed on a 2.3L Ford Engine for 100 hours to evaluate the success of each compound in reducing intake valve deposits (IVD, measured in mg). Dibutylamine Mannich compositions of

the present invention achieved surprising and unexpected success in comparison to fuels containing similar Mannich products.

TEST 1: Treat Rate=134.9 (ptb)

	H-6410 (DMAPA)	Diethylamine	Dipropylamine	Dibutylamine	H-6410 (DMAPA)
Intake valve deposits **(mg)**	62.0	43.9	39.0	27.6	51.9

TEST 2: Treat Rate=134.9 (ptb)

	H-6410 (DMAPA)	Monomethyl ethanolamine (MME)	H-6410 (DMAPA)	Dibutylamine	Dimethylamine
Intake valve deposits **(mg)**	51.4	61.9	36.8	25.7	47.5

TEST 3: Treat Rate=93.7 (ptb)

	Dibutylamine	Monomethyl ethanolamine (MME)	H-6410 (DMAPA)
Intake valve deposits **(mg)**	120.9	196.2	145.0

TEST 4: Treat Rate=72.0 (ptb)

	H-6421 (DMAPA)	Dibutylamine
Intake valve deposits **(mg)**	105.9	69.0

In obtaining the data presented in Tests 1-4, a standard DMAPA (dimethylaminopropylamine) Mannich compound (H-6410 and H-6421) was evaluated and compared to various dialkyl secondary amine Mannich product samples. All compounds were prepared according to the methods disclosed in the present application. The DMAPA Mannich product is not within the scope of the present invention, but it is known in the art to be effective in reducing intake valve deposits and was therefore used as a standard. The sequential application of the dialkyl secondary amine Mannich products was performed during a testing

interval, using the same engine and same fuel environment. In Test 1, drift is evident in the repeated application of the H-6410 DMAPA Mannich "standard" yielding different intake valve deposits. In addition to tests for comparing the IVD of different compounds, Tests 1 and 2 applied the Mannich compounds at a treat rate of 134.9 pounds per thousand barrels (ptb), whereas Test 3 had a treat rate of 93.7, and Test 4 had a treat rate of 72.0. As expected, the lowest accumulations of IVD occurred at the highest treat rate (134.9 ptb), but varied at lower treat rates.

As shown in Test 1, a reduction in intake valve deposits (IVD) correlates with the application of a dialkyl secondary amine in comparison to the H-6410 standard, applied at the beginning and end of the testing interval. However, the results achieved by the dibutylamine Mannich product are significantly lower than those of the diethylamine and dipropylamine products. Specifically, the dipropylamine Mannich product yielded IVD of 39.0, dibutylamine yielded 27.6, and the piperidine Mannich product yielded 27.5 mg. In Tests 2-4 the dibutylamine Mannich product again yielded substantially lower intake valve deposits than the DMAPA Mannich standards and similar dialkyl secondary amine products. The spectrum of differing results from similar dialkyl-based compounds does not predict the surprising effectiveness of the dibutylamine Mannich product claimed in the present invention.

It is clear that the dibutylamine Mannich reaction products reduce intake valve deposits more effectively than dialkyl secondary amine Mannich products of similar structure and DMAPA Mannich products, which could not have been predicted by one skilled in the art. The selection and surprising success of dibutylamine is sufficiently distinguishable from the broad class of amine compounds to render its resultant compositions and uses novel. The selection of dibutylamine was neither arbitrary nor fortunate; instead, purposeful, deliberate investigation and selection led its incorporation in the present invention. Additionally, as previously presented, specificity in the structure of the hydroxyaromatic compound, with concomitant reduction in undesirable byproducts, leads to additional novelty.

In summary, the surprising success of dibutylamine compared to similar dialkyl amine Mannich products was not disclosed in the prior art and could not have been predicted from the disclosure of Malfer '988. The selection of dibutylamine as the constituent for the Mannich

reaction in the present application yields novel compositions and methods not previously contemplated.

Rejections under 35 USC § 103(a)

The Examiner also rejected claims 12, 34, 56, and 62 as unpatentable due to obviousness in light of Malfer (US 5,697,988), hereinafter Malfer '988. In further rejections, the Examiner rejected claims 14-16 and 36-38 as unpatentable over Malfer '988 in view of Malfer (US 5,725,612), hereinafter Malfer '612. However, as presently amended, the claims specify an embodiment not obvious from the teachings of Malfer '988 and Malfer '612, alone or in combination. While Malfer '612 demands specificity in the hydroxyaromatic constituent in the Mannich reaction, it permits incorporation of the broad class of amine constituents discussed previously. The unexpected success demonstrated using dibutylamine as the amine component in the Mannich reaction could not be deduced from either reference, and an investigator skilled in the art would not have been led to select dibutylamine from the wide range of amine constituents disclosed in both references. Dialkyl amine Mannich products were not shown by either reference to be more effective than other amines, and dibutylamine is not known in the art to be superior to other dialkyl amine constituents in the Mannich reaction.

Referring to Tests 1-4 (above), the reduced intake valve deposits achieved using dibutylamine in the Mannich reaction significantly differed from results using similar compounds. Further, it would not have been obvious from Malfer '988 to preferentially select dibutylamine simply because that reference discloses dimethylamine (column 4, line 11). As shown in Test 1, the IVD results using dimethylamine more closely paralleled other, less similar compounds (such as DMAPA), than dibutylamine. Thus, these results overturn the presumed expectation that a similar or homologous compound would possess similar properties.

In summary, while the references disclose elements of the Mannich reaction, they do not disclose the specific amine and hydroxyaromatic constituent as elements of the Mannich reaction disclosed in the present invention. It would not have been obvious to one skilled in the art to undertake the Mannich reaction using dibutylamine because it was selected from the broad class of amines disclosed by both references, and it was not predictable that this compound would achieve greater success than compounds of similar structure.

It is respectfully requested that the Examiner withdraw the objections under 35 USC §§102(b) and 103(a), as the amended claims meet the requirements of these sections. The references cited by the Examiner disclose broad classes of similar compounds but do not rely on the selected constituent of the present invention, namely dibutylamine as the amine utilized in the Mannich reaction. The present invention's selection of the preferred embodiment, dibutylamine, overcomes the Examiner's rejections in light of the references and provides compositions and methods that achieve surprising success in reducing intake valve deposits and minimizing valve sticking.

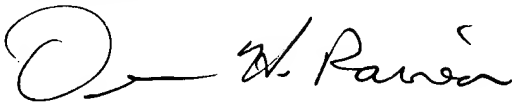
The advantages of the present invention are distinguishable from the references cited by the Examiner, which neither disclose nor suggest the compositions and processes of the present application. It is submitted that the Examiner's objections have been overcome in the attached remarks demonstrating the differences between the present application and the references cited. It is respectfully requested that the Examiner find the application in condition for subsequent allowance.

Fees and Time Extensions

As this response is submitted within the shortened statutory period, it is believed that no fees are due. In the event that the undersigned has miscalculated, an appropriate extension of time to respond is respectfully requested, and the Commissioner is authorized to debit an appropriate sum from the deposit account of the undersigned attorney, no. 05-1372.

Thank you for your attention to this matter, and please contact me at your convenience if you have any questions or require additional information.

Sincerely,



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March 17, 2003

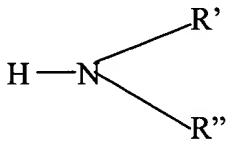
Enclosures

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s):	Malfer et al.	**Examiner:**	Toomer, Cephia D.
Date Filed:	02/02/2001	**Art Unit:**	1714
Application No.:	09/776,036	**Confirmation No.:**	8721
Title:	SECONDARY AMINE MANNICH DETERGENTS		

AMENDMENTS TO CLAIMS MADE IN RESPONSE TO OFFICE ACTION DATED JANUARY 15, 2003

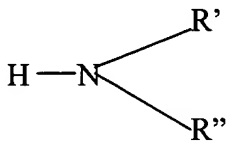
1. (Amended) A Mannich reaction product obtained by reacting (i) at least one di-substituted hydroxyaromatic compound having on the ring both (a) an aliphatic hydrocarbyl substituent derived from a polyolefin having a number average molecular weight in the range of about 500 to about 3000, and (b) a C_{1-4} alkyl; (ii) dibutylamine [at least one secondary amine of the formula



wherein R' and R" are independently alkyl groups having from 1 to 30 carbon atoms]; and (iii) at least one aldehyde.

17. (Amended) A fuel additive composition comprising:

a) a fuel soluble Mannich detergent/dispersant obtained by reacting (i) at least one di-substituted hydroxyaromatic compound having on the ring both (a) an aliphatic hydrocarbyl substituent derived from a polyolefin having a number average molecular weight in the range of about 500 to about 3000, and (b) a C_{1-4} alkyl; (ii) dibutylamine [at least one secondary amine of the formula

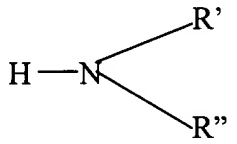


wherein R' and R" are independently alkyl groups having from 1 to 30 carbon atoms]; and (iii) at least one aldehyde; and

b) at least one liquid carrier for said Mannich detergent/dispersant in proportions such that for each part by weight of Mannich detergent/dispersant on an active ingredient basis there is in the range of about 0.3 to about 2.0 parts by weight of liquid carrier therefor.

40. (Amended) A fuel composition for use in a spark-ignition internal combustion engine comprising a spark-ignition fuel into which has been blended:

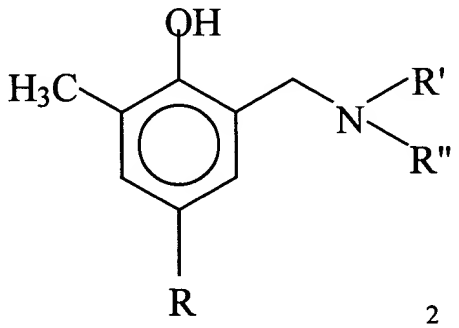
a) a fuel soluble Mannich detergent/dispersant obtained by reacting (i) at least one di-substituted hydroxyaromatic compound having on the ring both (a) an aliphatic hydrocarbyl substituent derived from a polyolefin having a number average molecular weight in the range of about 500 to about 3000, and (b) a C_{1-4} alkyl; (ii) dibutylamine [at least one secondary amine of the formula



wherein R' and R" are independently alkyl groups having from 1 to 30 carbon atoms]; and (iii) at least one aldehyde; and

b) at least one liquid carrier for said Mannich detergent/dispersant in proportions such that for each part by weight of Mannich detergent/dispersant on an active ingredient basis there is in the range of about 0.3 to about 2.0 parts by weight of liquid carrier therefor; wherein a) and b) are present in an amount at least sufficient to reduce or minimize the weight of intake valve deposits in a spark-ignition internal combustion engine operated on said fuel composition.

59. (Amended) A composition of matter of the formula:



wherein R comprises a hydrocarbyl substituent having a number average molecular weight in the range of about 500 to about 3000; and R' and R" are each a butyl group [independently alkyl groups having from 1 to 30 carbon atoms].

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s):	Malfer et al.	**Examiner:**	Toomer, Cephia D.
Date Filed:	02/02/2001	**Art Unit:**	1714
Application No.:	09/776,036	**Confirmation No.:**	8721
Title:	Secondary Amine Mannich Detergents		

PENDING CLAIMS AFTER AMENDMENTS MADE IN RESPONSE TO OFFICE ACTION DATED JANUARY 15, 2003

1. (Amended) A Mannich reaction product obtained by reacting (i) at least one di-substituted hydroxyaromatic compound having on the ring both (a) an aliphatic hydrocarbyl substituent derived from a polyolefin having a number average molecular weight in the range of about 500 to about 3000, and (b) a C_{1-4} alkyl; (ii) dibutylamine; and (iii) at least one aldehyde.

2. The Mannich product of claim 1 wherein the product is formed by heating a mixture of (i), (ii) and (iii) at a temperature above about 40°C.

3. The Mannich product of claim 1 wherein the mole ratio of (i):(ii):(iii) is 1:0.8-1.5:0.8-1.5.

4. The Mannich product of claim 3 wherein the mole ratio of (i):(ii):(iii) is 1:0.9-1.2:0.9-1.2.

5. The Mannich product of claim 4 wherein the mole ratio of (i):(ii):(iii) is 1:1.0-1.15:1.0-1.15.

6. The Mannich product of claim 1 wherein the mole ratio of aldehyde (iii) to amine (ii) is 1.2:1 or less.

7. The Mannich product of claim 6 wherein the mole ratio of aldehyde (iii) to amine (ii) is 1.1:1 or less.

8. The Mannich product of claim 6 wherein the mole ratio of aldehyde (iii) to amine (ii) is 1.2:1 to 1:1.

9. The Mannich product of claim 1 wherein the di-substituted hydroxyaromatic compound comprises a di-substituted hydroxyaromatic compound in which the hydrocarbyl substituent is derived from polypropylene, polybutylene or an ethylene alpha-olefin copolymer having a polydispersity in the range of about 1 to about 4.

13. The Mannich product of claim 1 wherein the hydrocarbyl substituent (a) of the substituted hydroxyaromatic compound is derived from polybutylene and the C_{1-4} alkyl (b) is methyl.

14. The Mannich product of claim 13 wherein at least 20 percent of the terminal olefinic double bonds in the polybutylene are alkylvinylidene.

15. The Mannich product of claim 14 wherein at least 50 percent of the terminal olefinic double bonds in the polybutylene are alkylvinylidene.

16. The Mannich product of claim 15 wherein at least 70 percent of the terminal olefinic double bonds in the polybutylene are alkylvinylidene.

17. (Amended) A fuel additive composition comprising:

a) a fuel soluble Mannich detergent/dispersant obtained by reacting (i) at least one di-substituted hydroxyaromatic compound having on the ring both (a) an aliphatic hydrocarbyl substituent derived from a polyolefin having a number average molecular weight in the range of about 500 to about 3000, and (b) a C_{1-4} alkyl; (ii) dibutylamine; and (iii) at least one aldehyde; and

b) at least one liquid carrier for said Mannich detergent/dispersant in proportions such that for each part by weight of Mannich detergent/dispersant on an active ingredient basis there is in the range of about 0.3 to about 2.0 parts by weight of liquid carrier therefor.

18. The composition of claim 17 wherein the Mannich detergent/dispersant is produced by heating a mixture formed from (i), (ii) and (iii), at a temperature above about 40°C.

19. The composition of claim 17 wherein the mole ratio of (i):(ii):(iii) is 1:0.8-1.5:0.8-1.5.

20. The composition of claim 19 wherein the mole ratio of (i):(ii):(iii) is 1:0.9-1.2:0.9-1.2.

21. The composition of claim 20 wherein the mole ratio of (i):(ii):(iii) is 1:1.0-1.15:1.0-1.15.

22. The composition of claim 17 wherein the mole ratio of aldehyde (iii) to amine (ii) is 1.2:1 or less.

23. The composition of claim 22 wherein the mole ratio of aldehyde (iii) to amine (ii) is 1.1:1 or less.

24. The composition of claim 22 wherein the mole ratio of aldehyde (iii) to amine (ii) is 1.2:1 to 1:1.

25. The composition of claim 17 wherein the liquid carrier comprises at least one member selected from the group consisting of mineral oil, poly-α-olefin oligomers, poly(oxyalkylene) compounds, polyalkenes and mixtures thereof.

26. The composition of claim 25 wherein the liquid carrier comprises at least one fuel-soluble poly(oxyalkylene) compound.

27. The composition of claim 26 wherein said poly(oxyalkylene) compound comprises at least one poly(oxyalkylene) monool formed from 1,2-alkylene oxide and one or more primary alcohols having at least 8 carbon atoms per molecule.

28. The composition of claim 27 wherein said poly(oxyalkylene) monool comprises at least one poly(oxypropylene) monool formed from 1,2-propylene oxide and one or more primary alcohols having at least 8 carbon atoms per molecule.

29. The composition of claim 25 wherein said liquid carrier comprises a mixture of at least one polyalkene and at least one poly(oxyalkylene) compound.

30. The composition of claim 17 further comprising at least one inert hydrocarbon solvent that has a boiling point or boiling range below about 200°C.

31. The composition of claim 17 wherein the di-substituted hydroxyaromatic compound comprises a di-substituted hydroxyaromatic compound in which the hydrocarbyl substituent is derived from polypropylene, polybutylene or an ethylene alpha-olefin copolymer having a polydispersity in the range of about 1 to about 4.

35. The composition of claim 17 wherein the hydrocarbyl substituent (a) of the di-substituted hydroxyaromatic compound is derived from polybutylene and the C_{1-4} alkyl (b) is methyl.

36. The composition of claim 17 wherein at least about 20 percent of the terminal olefinic double bonds in the polybutylene are alkylvinylidene.

37. The composition of claim 36 wherein at least about 50 percent of the terminal olefinic double bonds in the polybutylene are alkylvinylidene.

38. The composition of claim 37 wherein at least about 70 percent of the terminal olefinic double bonds in the polybutylene are alkylvinylidene.

39. A fuel composition for use in spark-ignition internal combustion engines comprising a spark-ignition fuel into which has been blended from about 5 to about 200 ptb of the Mannich product of claim 1.

40. (Amended) A fuel composition for use in a spark-ignition internal combustion engine comprising a spark-ignition fuel into which has been blended:

a) a fuel soluble Mannich detergent/dispersant obtained by reacting (i) at least one di-substituted hydroxyaromatic compound having on the ring both (a) an aliphatic hydrocarbyl substituent derived from a polyolefin having a number average molecular weight in the range of about 500 to about 3000, and (b) a C_{1-4} alkyl; (ii) dibutylamine; and (iii) at least one aldehyde; and

b) at least one liquid carrier for said Mannich detergent/dispersant in proportions such that for each part by weight of Mannich detergent/dispersant on an active ingredient basis there is in the range of about 0.3 to about 2.0 parts by weight of liquid carrier therefor; wherein a) and b) are present in an amount at least sufficient to reduce or minimize the weight of intake valve deposits in a spark-ignition internal combustion engine operated on said fuel composition.

41. The fuel composition of claim 40 wherein the Mannich detergent/dispersant is produced by heating a mixture formed from (i), (ii) and (iii), at a temperature above about 40°C.

42. The fuel composition of claim 40 wherein the mole ratio of (i):(ii):(iii) is 1:0.8-1.5:0.8-1.5.

43. The fuel composition of claim 42 wherein the mole ratio of (i):(ii):(iii) is 1:0.9-1.2:0.9-1.2.

44. The fuel composition of claim 43 wherein the mole ratio of (i):(ii):(iii) is 1:1.0-1.15:1.0-1.15.

45. The fuel composition of claim 40 wherein the mole ratio of aldehyde (iii) to amine (ii) is 1.2:1 or less.

46. The fuel composition of claim 45 wherein the mole ratio of aldehyde (iii) to amine (ii) is 1.1:1 or less.

47. The fuel composition of claim 45 wherein the mole ratio of aldehyde (iii) to amine (ii) is 1.2:1 to 1:1.

48. The fuel composition of claim 40 wherein the liquid carrier comprises at least one member selected from the group consisting of mineral oil, poly-α-olefin oligomers, poly(oxyalkylene) compounds, polyalkenes and mixtures thereof.

49. The fuel composition of claim 48 wherein the liquid carrier is at least one fuel-soluble poly(oxyalkylene) compound.

50. The fuel composition of claim 49 wherein said at least one poly(oxyalkylene) compound is at least one poly(oxyalkylene) monool formed from 1,2-alkylene oxide and one or more primary alcohols having at least 8 carbon atoms per molecule.

51. The fuel composition of claim 50 wherein said at least one poly(oxyalkylene) monool is at least one poly(oxypropylene) monool formed from 1,2-propylene oxide and one or more primary alcohols having at least 8 carbon atoms per molecule.

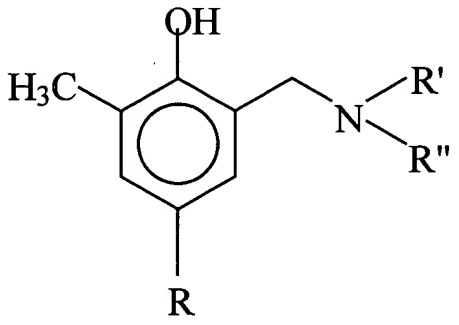
52. The fuel composition of claim 48 wherein said liquid carrier comprises a mixture of at least one polyalkene and at least one poly(oxyalkylene) compound.

53. The fuel composition of claim 40 wherein the di-substituted hydroxyaromatic compound comprises a di-substituted hydroxyaromatic compound in which the hydrocarbyl substituent is derived from polypropylene, polybutylene or an ethylene alpha-olefin copolymer having a polydispersity in the range of about 1 to about 4.

57. A method of minimizing or reducing intake valve deposits in a spark-ignition internal combustion engine which comprises providing as fuel for the operation of said engine and operating said engine, a fuel composition in accordance with claim 40.

58. A method of minimizing or reducing intake valve sticking in a spark ignition internal combustion engine which comprises providing as fuel for the operation of said engine and operating said engine, a fuel composition in accordance with claim 40.

59. (Amended) A composition of matter of the formula:



wherein R comprises a hydrocarbyl substituent having a number average molecular weight in the range of about 500 to about 3000; and R' and R" are each a butyl group.

63. The composition of matter of claim 59 wherein the hydrocarbyl substituent is derived from polypropylene, polybutylene or an ethylene alpha-olefin copolymer having a polydispersity in the range of about 1 to about 4.

64. A fuel additive composition comprising:

a) the composition of matter of claim 59; and

b) at least one liquid carrier for said composition of matter in proportions such that for each part by weight of said composition of matter on an active ingredient basis there is in the range of about 0.3 to about 2.0 parts by weight of liquid carrier therefor.

65. A fuel composition for use in a spark-ignition internal combustion engine comprising a spark-ignition fuel into which has been blended:

a) a composition of matter according to claim 59; and

b) at least one liquid carrier for said composition of matter in proportions such that for each part by weight of said composition of matter on an active ingredient basis there is in the range of about 0.3 to about 2.0 parts by weight of liquid carrier therefor;

wherein a) and b) are present in an amount at least sufficient to reduce or minimize the weight of intake valve deposits in a spark-ignition internal combustion engine operated on said fuel composition.